



Fluoroquinolone Prescribing Patterns in the Private Healthcare Sector of South Africa, 2005-2012

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SUMMARY. Increased prescribing of fluoroquinolones leading to resistance is an issue of concern at present globally. The present study was designed to investigate prescribing patterns for fluoroquinolones in a section of the South African private healthcare sector since 2005-2012 and is a retrospective analysis of the medicine claims database of a nationally (South African) representative Pharmacy Benefit Management (PBM) company data between 2005 and 2012. The target population consisted of a total of 3788438 patients older than 18 years (male/female ratio 1.2:1) claiming at least one antibiotic prescription. Fluoroquinolones were defined as all active substances available in South Africa at the time of the study, belonging to the J01MA classification of the ATC index. Data obtained included the NAPPI (National Pharmaceutical Product Index) code (a unique product identifier), the number of dosages dispensed and the number of days' supply. The data obtained were expressed in DDD/1000 inhabitants/day. The average DDD per prescription per patient per year was also determined to describe the trends over the study period. Descriptive and inferential statistics were used to analyse the data using the SAS Version 9.3. All statistically significant results were considered with a probability of $p < 0.05$. Fluoroquinolones represented 28% of all antibiotic prescriptions (N=7069563) claimed during the study period. A mean of 1.45 ± 0.92 (95% CI 1.44 - 1.45) prescriptions were claimed per patient in 2005, 1.46 ± 0.92 (95% CI 1.45-1.46) in 2006, 1.47 ± 0.93 (95% CI 1.47-1.48) in 2007, 1.45 ± 0.90 (95% CI 1.44-1.45) in 2008, 1.41 ± 0.85 (95% CI 1.41-1.42) in 2009, 1.40 ± 0.833 (95% CI 1.39-1.40) in 2010, 1.36 ± 0.74 (95% CI 1.33-1.34) in 2011 compared to 1.31 ± 0.71 (95% CI 1.31-1.32) during 2012 (Cohen's $d=0.2$). The association between number of prescriptions and gender ($p < 0.0001$, Cramer's $V = 0.02$) and age groups ($p < 0.0001$, Cramer's $V = 0.04$) was statistically but not practically significant. Ciprofloxacin [1.30 DID (2005), 1.42 DID (2006), 1.70 DID (2007), 1.63 DID (2008), 1.51 DID (2009), 1.48 DID (2010), 1.29 DID (2011) vs. 1.19 DID (2012)], levofloxacin [0.46 DID (2005), 0.58 DID (2006), 0.82 DID (2007), 0.95 DID (2008), 1.04 DID (2009), 0.97 DID (2010), 0.79 DID (2011) vs. 0.67 DID (2012)] and moxifloxacin [0.51 DID (2005), 0.60 DID (2006), 0.80 DID (2007), 0.70 DID (2008), 0.62 DID (2009), 0.57 DID (2010), 0.51 DID (2011) vs. 0.44 DID (2012)] were most claimed. The average DDD/prescription/patient/year for ciprofloxacin increased from 4.12 ± 3.21 (95% CI 4.10-4.13) in 2005 to 4.84 ± 2.27 (95% CI 4.83-4.86) in 2012 ($p < 0.0001$, Cohen's $d = 0.2$), vs. 5.47 ± 4.57 (5.43- 5.52) in 2005 to 7.52 ± 3.72 (7.48-7.56) during 2012 for levofloxacin ($p < 0.0001$, Cohen's $d = 0.5$), and 5.89 ± 5.45 (5.85-5.94) in 2005 to 5.90 ± 4.84 (5.84-5.96) in 2012 for moxifloxacin ($p < 0.0001$, Cohen's $d = 0.002$). The study concluded that the number of patients receiving fluoroquinolones generally decreased in the private healthcare sector during the study period. Gender and age were found as weak predictors of fluoroquinolones use. The ATC classification and the DDD unit of measurement have provided a platform to compare drug use at various healthcare levels in different settings and geographic locations.

RESUMEN. El aumento de la resistencia a las fluoroquinolonas es un tema preocupante a nivel mundial. El presente estudio fue diseñado para investigar los patrones de prescripción de las fluoroquinolonas en una sección del sector sanitario privado de Sudáfrica desde 2005-2012 y es un análisis retrospectivo de la base de datos a nivel nacional de la Administración de Beneficios de Farmacia (PBM) en Sudáfrica entre 2005 y 2012. La población estudiada consistió en 3.788.438 pacientes mayores de 18 años (relación hombre/mujer de 1,2:1) reclamando al menos una prescripción de antibióticos. Las fluoroquinolonas incluidas fueron todas las disponibles en Sudáfrica en el momento del estudio, perteneciente a la clasificación J01MA del índice ATC. Los datos obtenidos incluyeron el código NAPPI (Índice Nacional de Producto Farmacéutico, un identificador de producto único), el número de dosis dispensadas y el número de días de suministro. Los datos obtenidos se expresaron en DDD/1.000 habitantes/día. El DDD medio por receta por paciente y año también describir las tendencias a lo largo del periodo en estudio. Se utilizaron estadística descriptiva e inferencial para analizar los datos utilizando la versión SAS 9.3. Todos los resultados estadísticamente significativos fueron considerados con una probabilidad de $p < 0,05$. Durante el periodo de estudio las fluoroquinolonas representaron 28% de todas las prescripciones de antibióticos (n = 7.069.563). Una media de $1,45 \pm 0,92$ (95% CI 1,44-1,45) recetas fueron realizadas por paciente en el año

2005, $1,46 \pm 0,92$ (95% CI 1,45-1,46) en el año 2006, $1,47 \pm 0,93$ (95% CI 1,47-1,48) en 2007, $1,45 \pm 0,90$ (95% CI 1,44-1,45) en 2008, $1,41 \pm 0,85$ (95% CI 1,41-1,42) en 2009, $1,40 \pm 0,833$ (95% CI 1,39-1,40) en 2010; $1,36 \pm 0,74$ (95% CI 1,33-1,34) en 2011 en comparación con $1,31 \pm 0,71$ (95% CI 1,31-1,32) durante el año 2012 (Cohen's $d = 0,2$). La asociación entre el número de recetas y el sexo ($p < 0,0001$, V de Cramer = 0,02) y los grupos étnicos ($p < 0,0001$, V de Cramer = 0,04) fue estadísticamente pero no prácticamente significativa. La ciprofloxacina [1,30 DID (2005), 1,42 DID (2006), 1,70 DID (2007), 1,63 DID (2008), 1,51 DID (2009), 1,48 DID (2010), 1,29 DID (2011) vs. 1,19 DID (2012)], la levofloxacina [0,46 DID (2005), 0,58 DID (2006), 0,82 DID (2007), 0,95 DID (2008), 1,04 DID (2009), 0,97 DID (2010), 0,79 DID (2011) frente a 0,67 DID (2012)] y la moxifloxacina (0,51 DID (2005), 0,60 DID (2006), 0,80 DID (2007), 0,70 DID (2008), 0,62 DID (2009), 0,57 DID (2010), 0,51 DID (2011) vs. 0,44 DID (2012)] fueron las más reclamadas. El promedio DDD/receta/paciente/año para la ciprofloxacina aumentó de $4,12 \pm 3,21$ (95% CI 04.10 a 04.13) en 2005 a $4,84 \pm 2,27$ (95% CI 4,83-4,86) en 2012 ($p < 0,0001$, Cohen's $d = 0,2$), frente a $5,47 \pm 4,57$ (5,43-5,52) en 2005 a $7,52 \pm 3,72$ (7,48-7,56) durante 2012 para levofloxacina ($p < 0,0001$, Cohen's $d = 0,5$), y $5,89 \pm 5,45$ (5,85-5,94) en 2005 a $5,90 \pm 4,84$ (5,84-5,96) en 2012 para moxifloxacina ($p < 0,0001$, Cohen's $d = 0,002$). El estudio llegó a la conclusión de que el número de pacientes que reciben fluoroquinolonas en general disminuyó en el sector privado de la salud durante el período de estudio. Sexo y edad se encontraron como predictores débiles de uso de fluoroquinolonas. La clasificación ATC y la unidad de medida DDD han proporcionado una plataforma para comparar el consumo de drogas en los distintos niveles de salud en diferentes contextos y ubicaciones geográficas.

KEY WORDS: fluoroquinolone prescribing patterns, healthcare, South Africa 2005-2012.

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